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EXAMINER	
BARAN, MARY C	
ART UNIT	**PAPER NUMBER**
2857	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/924,038	BRCKA ET AL.	
	Examiner	Art Unit	
	Mary Kate B Baran	2857	AW

-- Th MAILING DATE of this communication appears on th cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 October 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-41* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-41* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *07 August 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Drawings

1. The drawings are objected to because in Figure 8, block 171 the term "champer" should be – chamber –. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

2. The disclosure is objected to because of the following informalities: on page 31 line 22 the term "being" should be – be –.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-41 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Referring to claims 1, 8, 10, 12, 18, 25 and 32, Applicant states "determining whether the performance of the electrostatic chuck is adequate to install the electrostatic chuck in the second vacuum chamber of the semiconductor processing system in the production line". This language is unclear because the prior language in

the claim states that "providing a second reference value of a second performance characteristic correlated with satisfactory performance of a reference electrostatic chuck when placed in the second vacuum chamber of the semiconductor processing system in the production line and operated under standard conditions of operation" indicating that the electrostatic chuck has already been installed in a second vacuum chamber.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-11, 18-20, 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuse et al. (U.S. Patent No. 5,951,772) (hereinafter Matsuse) in view of Dahimene et al. (U.S. Patent No. 6,198,616).

Referring to claim 1, Matsuse teaches a method of characterizing the performance of an electrostatic chuck in a first vacuum chamber for use in a second vacuum chamber of a semiconductor processing system in a production line (see Matsuse, Figure 3 and column 12 lines 6-15); positioning the electrostatic chuck within the first vacuum chamber (see Matsuse, column 12 lines 31-42); and based on the results of comparison, determining whether the performance of the electrostatic chuck is adequate to install the electrostatic chuck in the second vacuum chamber of the semiconductor processing system in the production line (see Matsuse, column 12 lines

31-42). Matsuse does not teach providing a first reference value of a first performance characteristic correlated with satisfactory performance of a reference electrostatic chuck when placed in the second vacuum chamber of the semiconductor processing system in the production line and operated under standard conditions of operation; measuring a first measured value for the first performance characteristic of the electrostatic chuck; or comparing the first measured value of the first performance characteristic with the first reference value, the comparison providing an indication of the performance of the electrostatic chuck.

Dahimene teaches providing a first reference value of a first performance characteristic correlated with satisfactory performance of a reference electrostatic chuck when placed in the second vacuum chamber of the semiconductor processing system in the production line and operated under standard conditions of operation (see Dahimene, column 7 line 63 – column 8 line 12); measuring a first measured value for the first performance characteristic of the electrostatic chuck (see Dahimene, column 5 lines 11-30); and comparing the first measured value of the first performance characteristic with the first reference value, the comparison providing an indication of the performance of the electrostatic chuck (see Dahimene, column 7 line 63 – column 8 line 12).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the teachings of Matsuse to include the teachings of Dahimene because measuring, collecting and comparing performance data would have allowed

the skilled artisan to achieve constant desired results and optimal chucking for a particular wafer type and/or process (see Dahimene, column 5 lines 25-30).

Referring to claim 2, Matsuse teaches placing a substrate in a supported position on the support surface of the electrostatic chuck (see Matsuse, column 15 lines 10-17).

Referring to claim 3, Matsuse teaches all the features of the claimed invention except for generating a plasma in the first vacuum chamber and exposing the substrate to the generated plasma.

Dahimene teaches generating a plasma in the first vacuum chamber and exposing the substrate to the generated plasma (see Dahimene, column 6 lines 5-27).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the teachings of Matsuse to include the teachings of Dahimene because generating a plasma would have allowed the skilled artisan to process the wafer with different chemistries (see Dahimene, column 6 lines 5-7).

Referring to claim 4, Matsuse teaches all the features of the claimed invention except for applying an RF bias potential to the electrostatic chuck to attract charged particles from the plasma to the surface of the substrate.

Dahimene teaches applying an RF bias potential to the electrostatic chuck to attract charged particles from the plasma to the surface of the substrate (see Dahimene, column 6 lines 5-27).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the teachings of Matsuse to include the teachings of Dahimene because applying an RF bias potential would have allowed the skilled artisan to process the wafer (see Dahimene, column 6 lines 5-7).

Referring to claim 5, Matsuse teaches all the features of the claimed invention except for applying a clamping voltage to the electrostatic chuck to create an attractive force that clamps the substrate to the support surface.

Dahimene teaches applying a clamping voltage to the electrostatic chuck to create an attractive force that clamps the substrate to the support surface (see Dahimene, column 5 line 61 – column 6 line 4).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the teachings of Matsuse to include the teachings of Dahimene because clamping the substrate to the support surface using the electrostatic chuck would have allowed the skilled artisan the greatest uniform physical contact between the wafer and the support (see Dahimene, column 1 line 65 – column 2 line 3).

Referring to claim 6, Matsuse further teaches heating the electrostatic chuck to a first predetermined temperature (see Matsuse, column 8 lines 52-55).

Referring to claim 7, Matsuse teaches all the features of the claimed invention except that the first performance characteristic is selected from the group consisting of a

current-voltage characteristic, an impedance characteristic, a plasma current-collection voltage characteristic, and a heating/cooling characteristic.

Dahimene teaches that the first performance characteristic is selected from the group consisting of a current-voltage characteristic (see Dahimene, column 5 lines 20-25), an impedance characteristic (see Dahimene, column 12 lines 50-61), a plasma current-collection voltage characteristic (see Dahimene, column 12 lines 50-61), and a heating/cooling characteristic (see Dahimene, column 5 lines 43-47).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the teachings of Matsuse to include the teachings of Dahimene because monitoring these process parameters would have allowed the skilled artisan to achieve optimal chucking (see Dahimene, column 5 lines 25-30).

Referring to claim 8, Matsuse further teaches determining whether the performance of the electrostatic chuck is adequate to install the electrostatic chuck in the second vacuum chamber of the semiconductor processing system in the production line (see Matsuse, column 12 lines 31-42). Matsuse does not teach providing a second reference value of a second performance characteristic correlated with satisfactory performance of a reference electrostatic chuck when placed in the second vacuum chamber of the semiconductor processing system in the production line and operated under standard conditions of operation; measuring a second value for the second performance characteristic of the electrostatic chuck; or comparing the second measured value of the second performance characteristic with the second reference

value, the comparison providing an indication of the performance of the electrostatic chuck.

Dahimene teaches providing a second reference value of a second performance characteristic correlated with satisfactory performance of a reference electrostatic chuck (see Dahimene, column 5 lines 11-30) when placed in the second vacuum chamber of the semiconductor processing system in the production line and operated under standard conditions of operation (see Dahimene, column 7 line 63 – column 8 line 12); measuring a second value for the second performance characteristic of the electrostatic chuck (see Dahimene, column 5 lines 11-30); and comparing the second measured value of the second performance characteristic with the second reference value, the comparison providing an indication of the performance of the electrostatic chuck (see Dahimene, column 7 line 63 – column 8 line 12).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the teachings of Matsuse to include the teachings of Dahimene because measuring, collecting and comparing performance data would have allowed the skilled artisan to achieve constant desired results and optimal chucking for a particular wafer type and/or process (see Dahimene, column 5 lines 25-30).

Referring to claim 9, Matsuse teaches all the features of the claimed invention except that the second performance characteristic is selected from the group consisting of a current-voltage characteristic, an impedance characteristic, a plasma current-collection voltage characteristic, and a heating/cooling characteristic.

Dahimene teaches that the performance characteristic is selected from the group consisting of a current-voltage characteristic (see Dahimene, column 5 lines 20-25), an impedance characteristic (see Dahimene, column 12 lines 50-61), a plasma current-collection voltage characteristic (see Dahimene, column 12 lines 50-61), and a heating/cooling characteristic (see Dahimene, column 5 lines 43-47).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the teachings of Matsuse to include the teachings of Dahimene because monitoring these process parameters would have allowed the skilled artisan to achieve optimal chucking (see Dahimene, column 5 lines 25-30).

Referring to claim 10, Matsuse further teaches determining whether the performance of the electrostatic chuck is adequate to install the electrostatic chuck in the second vacuum chamber of the semiconductor processing system in the production line (see Matsuse, column 12 lines 31-42). Matsuse does not teach providing a second reference value of the first performance characteristic correlated with satisfactory performance of a reference electrostatic chuck when placed in the second vacuum chamber of the semiconductor processing system in the production line and operated under standard conditions of operation; measuring a second value for the first performance characteristic of the electrostatic chuck; or comparing the second measured value of the first performance characteristic with the second reference value, the comparison providing an indication of the performance of the electrostatic chuck.

Dahimene teaches providing a second reference value of the first performance characteristic correlated with satisfactory performance of a reference electrostatic chuck (see Dahimene, column 5 lines 11-30) when placed in the second vacuum chamber of the semiconductor processing system in the production line and operated under standard conditions of operation (see Dahimene, column 7 line 63 – column 8 line 12); measuring a second value for the first performance characteristic of the electrostatic chuck (see Dahimene, column 5 lines 11-30); and comparing the second measured value of the first performance characteristic with the second reference value, the comparison providing an indication of the performance of the electrostatic chuck (see Dahimene, column 7 line 63 – column 8 line 12).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the teachings of Matsuse to include the teachings of Dahimene because measuring, collecting and comparing performance data would have allowed the skilled artisan to achieve constant desired results and optimal chucking for a particular wafer type and/or process (see Dahimene, column 5 lines 25-30).

Referring to claim 11, Matsuse teaches installing the electrostatic chuck in the second vacuum chamber of the semiconductor processing system in the production line (see Matsuse, column 12 lines 31-42).

Referring to claim 18, Matsuse teaches a method of characterizing the performance of an electrostatic chuck in a first vacuum chamber for use in a second

vacuum chamber of a semiconductor processing system in a production line (see Matsuse, Figure 3 and column 12 lines 6-15); and based on the results of comparison, determining whether the performance of the electrostatic chuck is adequate to install the electrostatic chuck in the second vacuum chamber of the semiconductor processing system in the production line (see Matsuse, column 12 lines 31-42). Matsuse does not teach that the electrostatic chuck has an electrode; providing a set of target currents defining a reference leakage current level correlated with satisfactory performance of a reference electrostatic chuck when placed in the second vacuum chamber of the semiconductor processing system in the production line and operated under standard conditions of operation; positioning the electrostatic chuck within the first vacuum chamber; selecting a range of voltages; applying each voltage to the electrode of the electrostatic chuck, one voltage at a time; measuring a current flowing to the electrode at each applied voltage to generate a set of actual currents; or comparing the set of actual currents with the set of target currents for the range of voltages, the comparison providing an indication of the performance of the electrostatic chuck.

Dahimene teaches that the electrostatic chuck has an electrode (see Dahimene, column 5 lines 61-64); providing a set of target currents defining a reference leakage current level correlated with satisfactory performance (see Dahimene, column 5 lines 11-30) of a reference electrostatic chuck when placed in the second vacuum chamber of the semiconductor processing system in the production line and operated under standard conditions of operation (see Dahimene, column 10 lines 10-31); positioning the electrostatic chuck within the first vacuum chamber; selecting a range of voltages (see

Dahimene, column 9 lines 25-30); applying each voltage to the electrode of the electrostatic chuck, one voltage at a time (see Dahimene, column 9 lines 30-47); measuring a current flowing to the electrode at each applied voltage to generate a set of actual currents (see Dahimene, column 10 lines 10-31); and comparing the set of actual currents with the set of target currents for the range of voltages (see Dahimene, column 10 lines 10-31), the comparison providing an indication of the performance of the electrostatic chuck (see Dahimene, column 5 lines 11-30).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the teachings of Matsuse to include the teachings of Dahimene because measuring, collecting and comparing performance data would have allowed the skilled artisan to achieve constant desired results and optimal chucking for a particular wafer type and/or process (see Dahimene, column 5 lines 25-30).

Referring to claim 19, Matsuse teaches placing a substrate in a supported position on the support surface of the electrostatic chuck (see Matsuse, column 15 lines 10-17).

Referring to claim 20, Matsuse teaches all the features of the claimed invention except for generating a plasma in the first vacuum chamber and exposing the substrate to the generated plasma.

Dahimene teaches generating a plasma in the first vacuum chamber and exposing the substrate to the generated plasma (see Dahimene, column 6 lines 5-27).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the teachings of Matsuse to include the teachings of Dahimene because generating a plasma would have allowed the skilled artisan to process the wafer with different chemistries (see Dahimene, column 6 lines 5-7).

Referring to claim 23, Matsuse further teaches heating the electrostatic chuck to a first predetermined temperature (see Matsuse, column 8 lines 52-55).

Referring to claim 24, Matsuse further teaches heating the electrostatic chuck to a second predetermined temperature that differs from the first predetermined temperature and repeating the steps of applying and measuring (see Matsuse, column 8 line 62 – column 9 line 1).

5. Claims 12-14, 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuse et al. (U.S. Patent No. 5,951,772) (hereinafter Matsuse) in view of Dahimene et al. (U.S. Patent No. 6,198,616), and further in view of Collins et al. (U.S. Patent No. 6,252,354) (hereinafter Collins).

Referring to claim 12, Matsuse teaches a method of characterizing the performance of an electrostatic chuck in a first vacuum chamber for use in a second vacuum chamber of a semiconductor processing system in a production line (see Matsuse, Figure 3 and column 12 lines 6-15); positioning the electrostatic chuck within the first vacuum chamber (see Matsuse, column 12 lines 31-42); and based on the

results of comparison, determining whether the performance of the electrostatic chuck is adequate to install the electrostatic chuck in the second vacuum chamber of the semiconductor processing system in the production line (see Matsuse, column 12 lines 31-42). Matsuse does not teach that the electrostatic chuck has an electrode; providing a set of target impedances defining a reference impedance level correlated with satisfactory performance of a reference electrostatic chuck when placed in the second vacuum chamber of the semiconductor processing system in the production line and operated under standard conditions of operation; selecting a plurality of frequencies within a defined frequency range; applying a signal across the electrode of the electrostatic chuck at each of the plurality of frequencies, one frequency at a time; measuring the impedance of the electrostatic chuck in response to the signal at each of the plurality of frequencies to generate a set of actual impedances; or comparing the actual impedances with the set of target impedances for the range of frequencies, the comparison providing an indication of the performance of the electrostatic chuck.

Dahimene teaches that the electrostatic chuck has an electrode (see Dahimene, column 5 lines 61-64); and providing a set of target impedances defining a reference impedance level (see Dahimene, column 12 lines 50-61) correlated with satisfactory performance of a reference electrostatic chuck (see Dahimene, column 5 lines 20-25) when placed in the second vacuum chamber of the semiconductor processing system in the production line and operated under standard conditions of operation (see Dahimene, column 7 line 63 – column 8 line 12).

Collins teaches selecting a plurality of frequencies within a defined frequency range (see Collins, column 5 line 62 – column 6 line 26); applying a signal across the electrode of the electrostatic chuck at each of the plurality of frequencies, one frequency at a time (see Collins, column 5 line 62 – column 6 line 26); measuring the impedance of the electrostatic chuck in response to the signal at each of the plurality of frequencies to generate a set of actual impedances (see Collins, column 5 line 62 – column 6 line 26); and comparing the actual impedances with the set of target impedances for the range of frequencies, the comparison providing an indication of the performance of the electrostatic chuck (see Collins, column 12 line 14-42).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the teachings of Matsuse to include the teachings of Dahimene because collecting and correlating performance data would have allowed the skilled artisan to achieve constant desired results and optimal chucking for a particular wafer type and/or process (see Dahimene, column 5 lines 25-30), and to further include the teachings of Collins, because measuring, collecting and comparing the impedances in a frequency range would have allowed the skilled artisan to optimize plasma characteristics (see Collins, column 5 lines 62-65).

Referring to claim 13, Matsuse teaches placing a substrate in a supported position on the support surface of the electrostatic chuck (see Matsuse, column 15 lines 10-17).

Referring to claim 14, Dahimene further teaches generating a plasma in the first vacuum chamber and exposing the substrate to the generated plasma (see Dahimene, column 6 lines 5-27).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the teachings of Matsuse and Collins to include the teachings of Dahimene because generating a plasma would have allowed the skilled artisan to process the wafer with different chemistries (see Dahimene, column 6 lines 5-7).

Referring to claim 17, Matsuse and Dahimene teach all the features of the claimed invention except that the step of measuring the impedance provides a measurement selected from the group consisting of magnitude and phase angle.

Collins teaches that the step of measuring the impedance provides a measurement selected from the group consisting of magnitude and phase angle (see Collins, column 12 lines 30-42).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the teachings of Matsuse and Dahimene to include the teachings of Collins because measuring the magnitude and phase would have allowed the skilled artisan to optimize the impedance (see Collins, column 12 lines 28-30).

6. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuse et al. (U.S. Patent No. 5,951,772) (hereinafter Matsuse), in view of Dahimene et al. (U.S. Patent No. 6,198,616), in view of Collins et al. (U.S. Patent No. 6,252,354)

(hereinafter Collins), and further in view of Shamouilian et al. (U.S. Patent No. 5,382,311) (hereinafter Shamouilian).

Referring to claim 15, Matsuse, Dahimene, and Collins teach all the features of the claimed invention except that the electrostatic chuck is a bipolar electrostatic chuck.

Shamouilian teaches that the electrostatic chuck is a bipolar electrostatic chuck (see Shamouilian, column 16 lines 16-20).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Matsuse, Dahimene, and Collins to include the teachings of Shamouilian because a bipolar chuck would have allowed the skilled artisan to have two electrodes biased relative to one another that are used to hold the substrate to a dielectric (see Shamouilian, column 16 lines 16-20).

7. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuse et al. (U.S. Patent No. 5,951,772) (hereinafter Matsuse) in view of Dahimene et al. (U.S. Patent No. 6,198,616), and further in view of Ishikawa et al. (U.S. Patent No. 5,382,311) (hereinafter Ishikawa)

Referring to claim 16, Matsuse and Dahimene teach all the features of the claimed invention except for disconnecting any RF power supply that is electrically connected to the electrostatic chuck.

Ishikawa teaches disconnecting any RF power supply that is electrically connected to the electrostatic chuck (see Ishikawa, column 8 lines 41-44).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Matsuse and Dahimene to include the teachings of Ishikawa because disconnecting the RF power supply would have allowed the skilled artisan to stop generation of the plasma (see Ishikawa, column 8 lines 41-44).

8. Claims 21, 22, 25-29 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuse et al. (U.S. Patent No. 5,951,772) (hereinafter Matsuse) in view of Dahimene et al. (U.S. Patent No. 6,198,616), and further in view of Shamouilian et al. (U.S. Patent No. 5,382,311) (hereinafter Shamouilian).

Referring to claim 21, Matsuse and Dahimene teach all the features of the claimed invention except that the electrostatic chuck is a bipolar electrostatic chuck.

Shamouilian teaches that the electrostatic chuck is a bipolar electrostatic chuck (see Shamouilian, column 16 lines 16-20).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Matsuse and Dahimene to include the teachings of Shamouilian because a bipolar chuck would have allowed the skilled artisan to have two electrodes biased relative to one another that are used to hold the substrate to a dielectric (see Shamouilian, column 16 lines 16-20).

Referring to claim 22, Matsuse and Dahimene teach all the features of the claimed invention except that the signal is applied to the two electrodes of the bipolar electrostatic chuck.

Shamouilian teaches that the signal is applied to the two electrodes of the bipolar electrostatic chuck (see Shamouilian, column 16 lines 16-20).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Matsuse and Dahimene to include the teachings of Shamouilian because a bipolar chuck would have allowed the skilled artisan to have two electrodes biased relative to one another that are used to hold the substrate to a dielectric (see Shamouilian, column 16 lines 16-20).

Referring to claim 25, Matsuse teaches a method of characterizing the performance of an electrostatic chuck in a first vacuum chamber for use in a second vacuum chamber of a semiconductor processing system in a production line (see Matsuse, Figure 3 and column 12 lines 6-15); positioning the electrostatic chuck within the first vacuum chamber (see Matsuse, column 12 lines 31-42); placing a substrate on the support surface of the electrostatic chuck (see Matsuse, column 15 lines 10-17); and based on the results of comparison, determining whether the performance of the electrostatic chuck is adequate to install the electrostatic chuck in the second vacuum chamber of the semiconductor processing system in the production line (see Matsuse, column 12 lines 31-42). Matsuse does not teach providing a target current defining a reference current level correlated with satisfactory performance of a reference electrostatic chuck when placed in the second vacuum chamber of the semiconductor processing system in the production line and operated under standard conditions of operation; selecting a predetermined position proximate to an exposed surface of the

substrate; positioning an electrode of a Langmuir probe adjacent the predetermined position; applying a collection voltage to the electrode of the Langmuir probe; measuring the current flowing from the plasma to the Langmuir probe; or comparing the measured current with the target current, the comparison providing an indication of the performance of the electrostatic chuck.

Dahimene teaches providing a target current defining a reference current level correlated with satisfactory performance of a reference electrostatic chuck (see Dahimene, column 5 lines 11-30) when placed in the second vacuum chamber of the semiconductor processing system in the production line and operated under standard conditions of operation (see Dahimene, column 7 line 63 – column 8 line 12); and comparing the measured current with the target current, the comparison providing an indication of the performance of the electrostatic chuck (see Dahimene, column 10 lines 10-31).

Shamouilian teaches selecting a predetermined position proximate to an exposed surface of the substrate (see Shamouilian, column 22 line 61 – column 23 line 17); positioning an electrode of a Langmuir probe adjacent the predetermined position (see Shamouilian, column 22 line 61 – column 23 line 17); applying a collection voltage to the electrode of the Langmuir probe (see Shamouilian, column 22 line 61 – column 23 line 17); and measuring the current flowing from the plasma to the Langmuir probe (see Shamouilian, column 22 line 61 – column 23 line 17).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the teachings of Matsuse to include the teachings of Dahimene

because collecting and correlating performance data would have allowed the skilled artisan to achieve constant desired results and optimal chucking for a particular wafer type and/or process (see Dahimene, column 5 lines 25-30), and to further include the teachings of Shamouilian, because using a Langmuir probe would have allowed the skilled artisan to obtain parameters pertaining to the plasma.

Referring to claim 26, Matsuse teaches all the features of the claimed invention except for a plurality of collection voltages to provide an array of current flowing from the plasma to the Langmuir probe as a function of collection voltage and the step of comparing comprises comparing the array of measured currents to an array of target currents to provide an indication of the performance of the electrostatic chuck.

Dahimene further teaches comparing comprises comparing the array of measured currents to an array of target currents to provide an indication of the performance of the electrostatic chuck (see Dahimene, column 5 lines 11-30).

Shamouilian further teaches for a plurality of collection voltages to provide an array of current flowing from the plasma to the Langmuir probe as a function of collection voltage (see Shamouilian, column 22 line 61 – column 23 line 17).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the teachings of Matsuse to include the teachings of Dahimene because measuring performance data would have allowed the skilled artisan to achieve constant desired results and optimal chucking for a particular wafer type and/or process (see Dahimene, column 5 lines 25-30), and to further include the teachings of

Shamouilian, because using a Langmuir probe would have allowed the skilled artisan to obtain parameters pertaining to the plasma.

Referring to claim 27, Matsuse teaches all the features of the claimed invention except for a plurality of predetermined positions to generate an array of current flowing from the plasma to the Langmuir probe as a function of predetermined position and wherein the step of comparing comprises comparing the array of measured currents to an array of target currents to provide an indication of the performance of the electrostatic chuck.

Dahimene further teaches that the step of comparing comprises comparing the array of measured currents to an array of target currents to provide an indication of the performance of the electrostatic chuck (see Dahimene, column 5 lines 11-30).

Shamouilian further teaches a plurality of predetermined positions to generate an array of current flowing from the plasma to the Langmuir probe as a function of predetermined position (see Shamouilian, column 22 line 61 – column 23 line 17).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the teachings of Matsuse to include the teachings of Dahimene because measuring performance data would have allowed the skilled artisan to achieve constant desired results and optimal chucking for a particular wafer type and/or process (see Dahimene, column 5 lines 25-30), and to further include the teachings of Shamouilian, because using a Langmuir probe would have allowed the skilled artisan to obtain parameters pertaining to the plasma.

Referring to claim 28, Dahimene further teaches applying an RF bias potential to the electrostatic chuck to attract charged particles from the plasma to the surface of the substrate (see Dahimene, column 6 lines 5-27).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the teachings of Matsuse to include the teachings of Dahimene because applying an RF bias potential would have allowed the skilled artisan to process the wafer (see Dahimene, column 6 lines 5-7).

Referring to claim 29, Dahimene further teaches applying a clamping voltage to the electrostatic chuck to create an attractive force that clamps the substrate to the support surface (see Dahimene, column 5 line 61 – column 6 line 4).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the teachings of Matsuse to include the teachings of Dahimene because clamping the substrate to the support surface using the electrostatic chuck would have allowed the skilled artisan the greatest uniform physical contact between the wafer and the support (see Dahimene, column 1 line 65 – column 2 line 3).

Referring to claim 31, Matsuse further teaches heating the electrostatic chuck to a first predetermined temperature (see Matsuse, column 8 lines 52-55).

9. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuse et al. (U.S. Patent No. 5,951,772) (hereinafter Matsuse) in view of Dahimene et al. (U.S. Patent No. 6,198,616), in view of Shamouilian et al. (U.S. Patent No. 5,382,311) (hereinafter Shamouilian), and further in view of Hashimoto et al. (U.S. Patent No. 5,779,925) (hereinafter Hashimoto).

Referring to claim 30, Matsuse, Dahimene and Shamouilian, teach all the features of the claimed invention except that the predetermined position is between the center of the substrate and the outer peripheral edge of the substrate.

Hashimoto teaches the predetermined position is between the center of the substrate and the outer peripheral edge of the substrate (see Hashimoto, column 6 lines 53-56).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Matsuse, Dahimene, and Shamouilian to include the teachings of Hashimoto because positioning the probe would have allowed the skilled artisan to collect plasma data at areas of interest.

10. Claims 32-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuse et al. (U.S. Patent No. 5,951,772) (hereinafter Matsuse) in view of Dahimene et al. (U.S. Patent No. 6,198,616), and further in view of Davenport et al. (U.S. Patent No. 6,509,069) (hereinafter Davenport).

Referring to claim 32, Matsuse teaches a method of characterizing the performance of an electrostatic chuck in a first vacuum chamber for use in a second

vacuum chamber of a semiconductor processing system in a production line (see Matsuse, Figure 3 and column 12 lines 6-15); positioning the electrostatic chuck within the first vacuum chamber (see Matsuse, column 15 lines 10-17); measuring the change in the temperature of the electrostatic chuck as a function of time (see Matsuse, column 10 line 63 – column 11 line 11); establishing the temperature of the electrostatic chuck at a predetermined temperature (see Matsuse, column 8 lines 52-55); discontinuing the temperature regulation of the electrostatic chuck (see Matsuse, column 8 line 62 – column 9 line 1); and based on the results of comparison, determining whether the performance of the electrostatic chuck is adequate to install the electrostatic chuck in the second vacuum chamber of the semiconductor processing system in the production line (see Matsuse, column 12 lines 31-42). Matsuse does not teach providing a target value defining a reference value correlated with satisfactory performance of a reference electrostatic chuck when placed in the second vacuum chamber of the semiconductor processing system in the production line and operated under standard conditions of operation; or comparing the measured value with a value, the comparison providing an indication of the performance of the electrostatic chuck, or a temperature profile.

Dahimene teaches that the electrostatic chuck is capable of being temperature regulated (see Dahimene, column 5 lines 41-47); providing a target value defining a reference value correlated with satisfactory performance of a reference electrostatic chuck when placed in the second vacuum chamber of the semiconductor processing system in the production line and operated under standard conditions of operation (see Dahimene, column 7 line 63 – column 8 line 12); and comparing the measured value

with a target value, the comparison providing an indication of the performance of the electrostatic chuck (see Dahimene, column 7 line 63 – column 8 line 12).

Davenport teaches a temperature profile (see Davenport, column 10 lines 3-5)

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the teachings of Matsuse to include the teachings of Dahimene and Davenport because monitoring and regulating the temperature of the electrostatic chuck would have allowed the skilled artisan to prevent wafer damage (see Dahimene, column 1 lines 59-63 and Davenport, column 7 lines 15-18).

Referring to claim 33, Dahimene further teaches generating a plasma by applying a first RF power to excite a pressure of a process gas provided in the first vacuum chamber (see Dahimene, column 6 lines 5-14).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the teachings of Matsuse and Davenport to include the teachings of Dahimene because generating a plasma would have allowed the skilled artisan to process the wafer with different chemistries (see Dahimene, column 6 lines 5-7).

Referring to claim 34, Dahimene further teaches generating a plasma by applying a second RF power to excite the pressure of the process gas provided in the first vacuum chamber (see Dahimene, column 6 lines 5-14), the second RF power differing from the first RF power (see Dahimene, column 10 lines 55-65).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the teachings of Matsuse and Davenport to include the teachings of Dahimene because generating a plasma would have allowed the skilled artisan to process the wafer with different chemistries (see Dahimene, column 6 lines 5-7).

Referring to claim 35, Matsuse further teaches placing a substrate in a supported position on the support surface of the electrostatic chuck (see Matsuse, column 15 lines 10-17), but does not teach applying an RF bias potential to the electrostatic chuck to attract charged particles from the plasma to the surface of the substrate.

Dahimene teaches applying an RF bias potential to the electrostatic chuck to attract charged particles from the plasma to the surface of the substrate (see Dahimene, column 6 lines 5-27).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the teachings of Matsuse and Davenport to include the teachings of Dahimene because applying an RF bias potential would have allowed the skilled artisan to process the wafer (see Dahimene, column 6 lines 5-7).

Referring to claim 36, Dahimene further teaches applying an RF bias potential at a second voltage level to the electrostatic chuck to attract charged particles from the plasma to the surface of the substrate (see Dahimene, column 6 lines 5-14), the second

voltage level differing form the first voltage level (see Dahimene, column 10 lines 55-65).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the teachings of Matsuse and Davenport to include the teachings of Dahimene because applying an RF bias potential would have allowed the skilled artisan to process the wafer (see Dahimene, column 6 lines 5-7).

Referring to claim 37, Matsuse further teaches that the temperature of the electrostatic chuck increases as a function of time (see Matsuse, column 10 line 63 – column 11 line 11).

Referring to claim 38, Matsuse teaches placing a substrate in a supported position on the support surface of the electrostatic chuck (see Matsuse, column 15 lines 10-17).

Referring to claim 39, Dahimene teaches applying a clamping voltage to the electrostatic chuck to create an attractive force that clamps the substrate to the support surface (see Dahimene, column 5 line 61 – column 6 line 4).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the teachings of Matsuse and Davenport to include the teachings of Dahimene because clamping the substrate to the support surface using the electrostatic chuck would have allowed the skilled artisan the greatest uniform physical

contact between the wafer and the support (see Dahimene, column 1 line 65 – column 2 line 3).

Referring to claim 40, Dahimene further teaches applying a DC voltage at a second voltage level to the electrostatic chuck to attract charged particles from the plasma to the surface of the substrate (see Dahimene, column 6 lines 5-14), the second voltage level differing from the first voltage level (see Dahimene, column 10 lines 55-65).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the teachings of Matsuse and Davenport to include the teachings of Dahimene because applying a DC voltage would have allowed the skilled artisan to process the wafer (see Dahimene, column 6 lines 5-7).

Referring to claim 41, Matsuse further teaches that the temperature of the electrostatic chuck decreases as a function of time (see Matsuse, column 10 line 63 – column 11 line 11).

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

(a) Kanno et al. teach a semiconductor manufacturing apparatus and method of processing a semiconductor wafer using plasma, and wafer voltage probe.

(b) Chen et al. teach a multi-chamber system for semiconductor process.

(c) Ke et al. teach a shield or ring surrounding semiconductor work piece in plasma chamber.

(d) Elliott teaches an electrostatic chuck.

(e) Hatano et al. teach a film forming and dry cleaning apparatus and method.

(f) Matsubara et al. teach an apparatus for forming films of a semiconductor device, and a method of forming thin films of a semiconductor.

(g) Stinnett teaches a method for etching and cleaning a substrate.

(h) Collins et al. teach an electrostatic chuck with an impregnated, porous layer that exhibits the Johnson-Rahbeck effect.

(i) Khurana et al. teach a method and apparatus for sputter etch conditioning a ceramic body.

(j) Ruffell et al. teach a backside gas delivery system for a semiconductor wafer processing system.

(k) Ichikawa teaches a method of production of a semiconductor substrate.

(l) Benjamin et al. teach a high flow vacuum chamber including equipment modules such as a plasma generating source, vacuum pumping arrangement and/or cantilevered substrate support.

(m) Benjamin et al. teach a universal vacuum chamber including equipment modules such as a plasma generating source, vacuum pumping arrangement and/or cantilevered substrate support.

(n) Sexton et al. teach a high temperature electrostatic chuck.

(o) Leeser teach a method and apparatus for controlling chucking force in an electrostatic chuck.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mary Kate B Baran whose telephone number is (703) 305-4474. The examiner can normally be reached on Monday - Friday from 8:00 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marc S Hoff can be reached on (703) 308-1677. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1782.

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